

CLAIMS

What is claimed is:

- 5 1. A method of making a dental appliance, said method comprising:
 (a) providing a dental mill blank comprising a substantially uncured, self-
supporting, hardenable organic composition;
 (b) machining the mill blank into an uncured shaped article; and
 (c) at least partially curing the shaped article to provide a hardened dental
10 appliance.
2. The method of claim 1, wherein the organic composition comprises a
substantially uncured composite material.
- 15 3. The method of claim 2, wherein the composite material comprises a
polymerizable resin system and an initiator system.
4. The method of claim 3, wherein the composite material further comprises a
20 filler system.
5. The method of claim 4, wherein the polymerizable resin system comprises a
crystalline component.
6. The method of claim 5, wherein the crystalline component is non-polymeric.
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7. The method of claim 5, wherein the crystalline component comprises one or
more polyester, polyether, polyolefin, polythioether, polyarylalkylene, polysilane,
polyamide, polyurethane, or combinations thereof.
- 30 8. The method of claim 7, wherein the crystalline component comprises saturated,
linear, aliphatic polyester polyols containing primary hydroxyl end groups.

9. The method of claim 8 wherein the hydroxyl end groups are modified to introduce polymerizable unsaturated functional groups.

10. The method of claim 5, wherein the crystalline component has a dendritic, hyperbranched, or star-shaped structure.

11. The method of claim 4, wherein the polymerizable resin system comprises at least one ethylenically unsaturated component.

12. The method of claim 11, wherein the ethylenically unsaturated component is selected from mono-, di-, or poly-acrylates and methacrylates, unsaturated amides, vinyl compounds, and combinations thereof.

13. The method of claim 4, wherein at least a portion of the filler system comprises particulate filler.

14. The method of claim 4, wherein the filler system comprises an inorganic material comprising nanoscopic particles.

15. The method of claim 4, wherein the initiator system comprises a free radical initiator.

16. The method of claim 4, wherein the initiator system comprises a photoinitiator or a thermal initiator.

17. The method of claim 4, wherein the mill blank further comprises a viscosity modifier.

18. The method of claim 4, wherein said mill blank further comprises a surfactant system.

19. The method of claim 1, wherein said dental appliance is a crown, an inlay, an onlay, a bridge, a veneer, an orthodontic appliance, a maxillofacial prosthesis, a tooth facsimile, or a tooth splint.

5 20. The method of claim 1, further comprising the step of processing the hardened dental appliance.

21. The method of claim 20, wherein the processing comprises surface treating, trimming, polishing, coating, priming, staining, or glazing the hardened dental appliance.

10 22. The method of claim 1, wherein said machining comprises milling the mill blank using computer-controlled milling equipment.

23. The method of claim 22, wherein the computer-controlled milling equipment
15 comprises a CAD/CAM device.

24. The method of claim 1, wherein a second machining step is performed after said curing step.

20 25. The method of claim 24, wherein a second curing step is performed after said second machining step.

26. The method of claim 25, wherein said second curing step is performed under different conditions from the initial curing step.

25 27. A method of making a dental appliance, said method comprising:
 (a) providing a dental mill blank comprising a substantially uncured, self-supporting, hardenable organic composition;
 (b) machining the mill blank into a preformed article;
30 (c) partially curing the preformed article to provide a partially cured article;
 (d) machining said partially cured article to form a shaped article; and

(e) at least partially curing said shaped article to provide a hardened dental appliance.

5 28. A dental mill blank comprising a substantially uncured, self-supporting hardenable organic composition.

29. The dental mill blank of claim 28, wherein the organic composition comprises a substantially uncured composite material.

10 30. The dental mill blank of claim 29, wherein the composite material comprises a polymerizable resin system and an initiator system.

31. The dental mill blank of claim 30, wherein the composite material further comprises a filler system.

15 32. The dental mill blank of claim 31, wherein the polymerizable resin system comprises a crystalline component.

20 33. The dental mill blank of claim 32, wherein the crystalline component is non-polymeric.

34. The dental mill blank of claim 32, wherein the crystalline component comprises one or more polyester, polyether, polyolefin, polythioether, polyarylalkylene, polysilane, polyamide, polyurethane, or combinations thereof.

25 35. The dental mill blank of claim 34, wherein the crystalline component comprises saturated, linear, aliphatic polyester polyols containing primary hydroxyl end groups.

30 36. The dental mill blank of claim 35, wherein the hydroxyl end groups are modified to introduce polymerizable unsaturated functional groups.

37. The dental mill blank of claim 32, wherein the crystalline component has a dendritic, hyperbranched, or star-shaped structure.

5 38. The dental mill blank of claim 31, wherein the polymerizable resin system comprises at least one ethylenically unsaturated component.

39. The dental mill blank of claim 38, wherein the ethylenically unsaturated component is selected from mono-, di-, or poly-acrylates and methacrylates, unsaturated
10 amides, vinyl compounds, and combinations thereof.

40. The dental mill blank of claim 31, wherein at least a portion of the filler system comprises particulate filler.

15 41. The dental mill blank claim 31, wherein the filler system comprises an inorganic material comprising nanoscopic particles.

42. The dental mill blank of claim 31, wherein the initiator system comprises a free radical initiator.

20 43. The dental mill blank of claim 31, wherein the initiator system comprises a photoinitiator or a thermal initiator.

44. The dental mill blank of claim 31 further comprising a viscosity modifier.

25 45. The dental mill blank of claim 31 further comprising a surfactant system.